

# Amygdalar volume alterations in children with Tourette syndrome: are they due to ADHD comorbidity?

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Ludolph et al. in this issue studied bilateral differences in the relative size of the amygdala in 17 males with Tourette syndrome (TS), using a hypothesis-driven, volume-of-interest volumetric approach with structural magnetic resonance imaging (MRI). Eight of the patients with TS also exhibited clinical signs of attention-deficit-hyperactivity disorder (ADHD). The authors found a significant decrease of the left-hemispheric amygdalar volumes relative to total brain volumes in patients with TS. Reduced amygdalar volumes correlated with ADHD symptoms but, interestingly, not with tic severity, suggesting only a partial overlap in the pathological processes in TS and ADHD.

The results of Ludolph et al. are in close agreement with a recent voxel-based morphometric MRI study by Stertzer et al. in 12 children with conduct disorder.<sup>1</sup> That study reported significant negative correlations between left amygdalar volume and test scores on aggressiveness and attention disorders. The exact nature of these volume changes remains to be clarified, but at first glance they suggest that the changes in the amygdala are related to the underlying pathology of the developmental neurological disorders TS, ADHD, and conduct disorder. In a recent meta-analysis of studies in children with TS and/or ADHD, Plessen et al. report that reductions in

the grey matter volume of frontal cortex and striatum were more frequent in children with ADHD, whereas volumetric reductions in the caudate nucleus and hypertrophy in prefrontal regions were associated with TS.<sup>2</sup> The current study of Ludolph et al. suggests the left amygdala as a possible site of neuropathogenesis in TS.

Larger clinical trials will be required to determine to what extent the observed changes in the amygdala denote a causal relationship with tic and attentional disorders. For the time being, these results deserve our attention as they suggest that the developmental disorders TS and ADHD may share common pathogenic mechanisms.

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## References

1. Stertzer P, Stadler C, Poustka F, Kleinschmidt A. A structural neural deficit in adolescents with conduct disorder and its association with lack of empathy. *NeuroImage* 2007; **37**: 335–42.
2. Plessen KJ, Royal JM, Peterson BS. Neuroimaging of tic disorders with co-existing attention-deficit/hyperactivity disorder. *Eur Child Adolesc Psychiatry* 2007; **16**(Suppl. 1): 60–70.